

Transforming the Navy with Web Technology

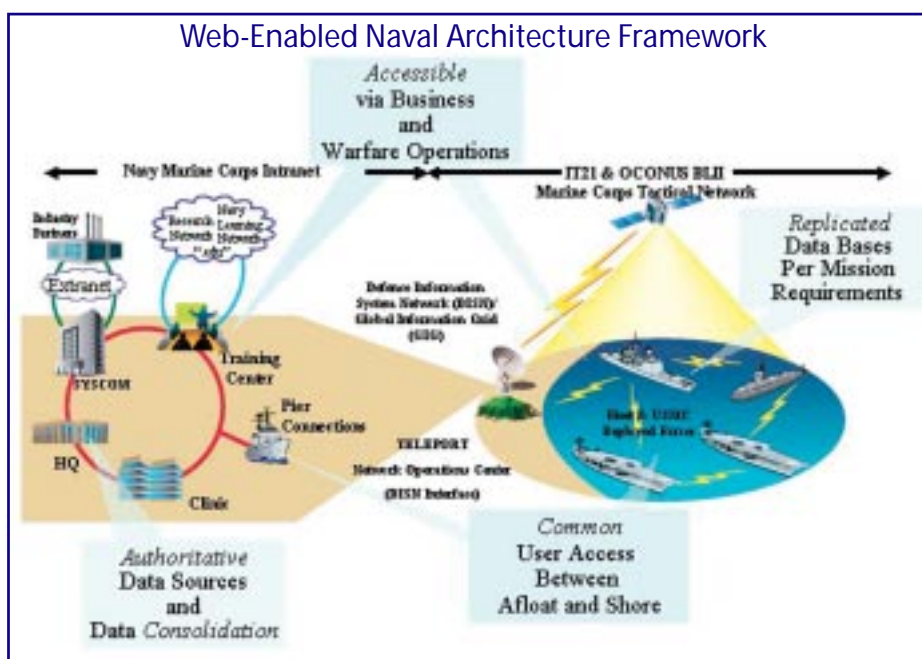
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The Chief of Naval Operations stated his vision for transforming the Navy in Sea Power 21, describing how Sea Shield, Sea Strike and Sea Basing will transform operations — and how ForceNet, will enable that vision. ForceNet is the operational construct and architectural framework for Naval warfare in the information age. Stated more simply, ForceNet is the keel upon which Sea Shield, Sea Basing and Sea Strike will be

built. A critical element in the development of ForceNet is the implementation of the *Web-Enabled Navy*. The full exploitation of Web technology is a critical element in the realization of the Sea Power vision.

Task Force Web (TFW) was established in April 2001 by Adm. Fallon, Vice Chief of Naval Operations, as the lead governance body for implementation of a standards-based Web-enabled framework for the Navy. A Web services architecture based on industry best practices allows the Navy to leverage powerful new technology to move and share data more quickly, securely, and reliably. Many challenges exist in implementing a true enterprise Web solution across the three main Navy enclaves: Navy Marine Corps Intranet (NMCI) within the continental United States (CONUS), IT-21, and the Base Level Information Infrastructure (BLII) for networks outside the continental United States (OCONUS), but the benefits to the end user far outweigh any challenges encountered along the way. Fundamental to this effort is the identification of authoritative data sources, establishment of data standards, elimination of duplicative infrastructure, and provision for a common user interface.

The complexity of the Navy's total communications operating environment was the overriding consideration in the development of the Web-Enabled Naval architecture from the beginning. To meet the unique challenges of the afloat environment and the three major enclaves, Web enablement is intertwined with the communications operating environment. Very often, "enterprise" solutions are developed without proper planning for the overall complexity of the communications context in which they will operate. Task Force Web engineers understand the challenges of implementing a solution between enclaves of vastly differing communications infrastructures and factored in critical required elements for an effective enterprise solution from the beginning. These elements included bandwidth limitations, synchronization,



replication, configuration management and security. In taking this approach, the Navy created a context for Web enablement that guarantees success for Web service developers.

The Navy developed the Navy Enterprise Portal (NEP) to provide the enterprise infrastructure for accessing Web services through a common user interface. The user experience is an important element of the infrastructure, providing a common "look and

feel" for the user. Users are given many options for customizing the information they want to see and the collaborative tools they wish to use. The NEP is the gateway to these capabilities and information.

The Web-Enabled Navy enterprise architecture is based on an n-tier solution, which results in cost savings, data sharing and reuse, and a more efficient infusion of technology upgrades. Separation of the presentation layer, application and data layers is the important first step toward achieving a Web services architecture. All Navy applications and databases, operational and administrative, are being recoded as Web services that will be available through the NEP. There are commercial products currently available that will assist developers in the rapid Web enablement of existing applications and databases without the high cost and lengthy period for professional service-based contracts. Misconceptions about the level of difficulty and expense for conversion are quickly dispelled with the use of these innovative tools. Industry continues to build newer products for converting legacy applications and databases into Web services, which can make the conversion process extremely efficient and economical. Cost savings under this architecture include significantly reducing redundant databases. The assignment of functional owners of data sources and data elements will provide improved data reliability and accessibility throughout the Navy. Also, the speed for updates is a dramatic improvement over the traditional client-server configuration — time is reduced from months to days.

"Web Services" is a term often used in Web technology discussions yet it is seldom understood. An example of Web services in the travel industry is Expedia.com. When a customer wants to travel from Los Angeles to New York and find the cheapest fare, he enters a few bits of information (i.e., departure city and date, return city and date) and requests feedback. Web services, using industry standards for describing (Extensible Markup Language

or XML) and moving (Simple Object Access Protocol or SOAP) data do the rest. Web services query the authoritative data sources maintained by the airlines and present the information to the traveler in one Web frame with a common look and feel. No longer do travelers need to query Web pages from each airline for a comparative analysis. The Navy is developing the infrastructure to support this same type of powerful capability for all Department of the Navy (DON) business and operational applications.

The vision for the NEP includes many instances of the same portal afloat and ashore configured to share information and replicate data such as portal profiles. The ultimate objective is that a Sailor traveling from a ship to the Pentagon would be able to log in and have the same pre-configured workspaces appear. Portals aboard each ship with replicated content, enable afloat users access to information during periods of disruptions in radio frequency data links and minimize bandwidth requirements.

The NEP is currently available both afloat and ashore to all Navy personnel. This ubiquitous access provides visibility to Web services, which was not possible in the old client-server or Web-based programs. Users can now easily discover Web services through the NEP and reuse data or services to fulfill their information requirements. In the past, new databases or applications were created because well meaning developers weren't aware that a comparable service already existed. With the NEP, the traditional approach of building and maintaining an application and backend database for every function can be eliminated, resulting in huge savings for the Navy in infrastructure, manpower and funding. The NEP also reduces shipboard server equipment. This is critical in reducing the burden on the ship's electrical load, heat generation, space, and systems administrator requirements.

Using nonproprietary products and an open-standards approach allows everyone to bring their content into a shared environment. The Navy's approach for an enterprise portal solution is one of standards compliance, not product or vendor dependence. By adding a layer of abstraction, the Navy is able to realize the benefits of portal technology with the advantage of not being tied to specific portal product vendors. This layer of abstraction is the Portal Connector, which is essentially an interface between the applications, the portal and the backend data source. Unlike today's commercial portal environment where all Web services are directly coded to a specific proprietary portal product, Navy developers code to the Portal Connector interface and portal engineers code once from the interface to the portal. Application and data owners develop their Web services based on standards issued in the Navy Enterprise Application Developers Guide and bind their Web services to the Portal Connector.

As the portal market matures, should the Navy decide to switch to a newer product, the only recoding necessary would be for the piece between the portal and the interface itself, thus removing the costly and time-consuming coding burden on thousands of Navy developers. By using this component approach, the Navy can more quickly and economically continue to improve the enterprise Web architecture. Since no comparable interface is currently available in industry, the Portal Connector was developed by government programmers. However, there are industry standards beginning to gather momentum in this area, such as Web Service for Remote Portals by the OASIS standards body and JSR

168 by the J2EE standards body. TFW architects have envisioned that as these mature standards are ratified by the standards bodies and are approved and accepted by vendors, and the open source community, the Navy will replace their homegrown interface solution with a commercial or open source solution.

There are several other bleeding edge technologies that TFW is implementing which will significantly improve the Navy's Web environment for users. These include Single Sign On (SSO), Universal Description, Discovery and Integration (UDDI), enterprise-wide portal user profile replication, improved taxonomy management, and workplace management configuration. Many of these solutions include significant challenges, such as ensuring interdomain SSO and an enterprise replication and synchronization model for portal profiles and content. TFW works aggressively to ensure that solutions implemented align with the overall objective of an open standards-based enterprise.

TFW has made significant progress in the development and implementation of the NEP over the past year. These initiatives include:

- ◆ Deploying the only enterprise portal solution in the Navy that operates in both the afloat and ashore environments.
- ◆ Integration of the NEP into the technical requirements for all three Navy enclaves. All baseline networks in each of these enclaves now include NEP.
- ◆ In conjunction with NMCI and the Program Executive Office for Information Technology (PEO-IT), TFW provided the first-ever single guidance document for developers to build enterprise Web services from their legacy applications. The Navy Enterprise Application Developers Guide is a living document, continually updated to reflect industry Web technology advancements.
- ◆ NEP was installed in seven ships from the USS Theodore Roosevelt Battle Group in less than two months.
- ◆ Over 100 Web services have passed the TFW testing labs for integration into the portal and thousands more are in development by commands throughout the Navy. This effort is in support of the VCNO's April 2004 deadline for Web enablement of all Navy applications and databases.
- ◆ NEP is playing a major role afloat in the upcoming ForceNet exercise this year.
- ◆ NEP has been installed on COMSECONDFLT and is being used by the staff to improve knowledge management in conjunction with an ebusiness grant from the Navy.
- ◆ Portals are planned for installation in Hawaii and Naples in March and April 2003 to provide ashore commanders quicker access to enterprise Web-enabled services and for hosting locally developed Web services.
- ◆ TFW is working with OPNAV N7/N61 on implementation of the Navy Global Directory Services, which is a critical component to inter-enclave replication of user profiles and directories.
- ◆ TFW sponsored a proposal to the Joint Staff for development of a Joint UDDI for Web services interoperability. The proposal was accepted by the Military Communications and Electronics Board fall 2002 and is scheduled for implementation in summer 2003.

The Navy is using innovative new technologies to achieve the CNO's objectives for Sea Power 21. These are exciting times for the Navy. As Information Professional Officers it has been exhilarating for us to see the power of technology and be able to quickly get it into the hands of Navy personnel. The Sea Power 21 vision becomes reality through the concentrated efforts of Navy leadership and commands — all committed to leveraging key Web technologies to improve our warfighting processes. □